

ABSTRACT

A novel process for preparing chromium dioxide of substantially high purity as well as composites of CrO<sub>2</sub>/Cr<sub>2</sub>O<sub>3</sub> and CrO<sub>2</sub>/Cr<sub>2</sub>O<sub>5</sub> following a sequence of simple steps. The process does not require pressure as a control parameter during the process of synthesis. No chemical modifier has been used to bring down the working pressure during synthesis. Fairly hard sintered pellets of CrO<sub>2</sub> can be obtained without introducing any detectable impurity phase that usually appears during the process of sintering. Further, CrO<sub>2</sub>/Cr<sub>2</sub>O<sub>3</sub> and CrO<sub>2</sub>/Cr<sub>2</sub>O<sub>5</sub> composites have also been prepared where the fraction of insulating Cr<sub>2</sub>O<sub>3</sub> or Cr<sub>2</sub>O<sub>5</sub> in metallic CrO<sub>2</sub> can be easily controlled. Significant negative magnetoresistance is found in pure CrO<sub>2</sub> (5% MR) as well as CrO<sub>2</sub>/Cr<sub>2</sub>O<sub>3</sub> (33% MR) composites near room temperature. The MR studies on the CrO<sub>2</sub> /Cr<sub>2</sub>O<sub>5</sub> composites have been done and significant negative MR (22%) has been found in CrO<sub>2</sub>/Cr<sub>2</sub>O<sub>5</sub> composites near room temperature.